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Appln. Serial No. 10/849,752
Amendment Dated August 7, 2007
Reply to Office Action Mailed May 7, 2007

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AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

1 1. -- 2. (Cancelled)

1 3. (Currently Amended) A storage device comprising:
2 a storage medium having a plurality of storage cells; [[and]]
3 a probe to read from and write to the storage cells,
4 wherein the storage medium includes a first structure and second structure,
5 wherein a first storage cell containing a transition between the first structure and
6 the second structure contains a data bit having a first state, [[and]]
7 wherein a second storage cell including the first structure but not including a
8 transition between the first structure and the second structure contains a data bit having a second
9 state, and
10 wherein a third storage cell including the second structure but not including a
11 transition between the first structure and the second structure contains a data bit having the
12 second state.

1 4. (Original) The storage device of claim 3, wherein the first structure comprises a
2 trench, and the second structure comprises a surface of the storage medium.

1 5. (Previously Presented) The storage device of claim 3, wherein the first structure
2 has a different physical characteristic than the second structure.

1 6. (Previously Presented) The storage device of claim 3, wherein the first structure
2 has a different chemical characteristic than the second structure.

1 7. (Previously Presented) The storage device of claim 3, wherein the first structure
2 has a different electronic characteristic than the second structure.

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- 1 8. (Previously Presented) The storage device of claim 3, wherein the probe
2 comprises a nanotechnology probe.
- 1 9. (Currently Amended) A system comprising:
2 a processor; and
3 a storage device coupled to the processor, the storage device comprising:
4 a probe;
5 a storage medium having a storage surface, the probe to form a trench in the
6 storage medium, wherein a transition between the trench and the storage surface represents a first
7 storage state, and wherein lack of a transition between the trench and the storage surface
8 represents a second different storage state, wherein the storage medium includes storage cells
9 including:
10 a first storage cell located in a first region containing a first end of the
11 trench;
12 a second storage cell located in a second region containing a second end of
13 the trench, each of the first and second ends constituting a transition;
14 a third storage cell located in a third region containing a portion of the
15 trench without presence of the storage surface; and
16 a fourth storage cell located in a fourth region containing a portion of the
17 storage surface of the storage medium away from the trench,
18 wherein each of the first and second storage cells stores a respective data
19 bit having the first storage state, and each of the third and fourth storage cells stores a respective
20 data bit having the second storage state.
- 1 10. – 12. (Cancelled)
- 1 13. (Original) The system of claim 9, further comprising read circuitry to detect
2 engagement of the probe with a transition between the trench and the storage surface.

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1 14. (Original) The system of claim 13, wherein the probe has a tip, the probe tip and
2 the storage medium moveable with respect to each other to enable the probe tip to engage the
3 storage surface, the trench, and any transition between the trench and the storage surface.

1 15. (Original) The system of claim 14, wherein the probe tip is adapted to form the
2 trench during a write operation.

1 16. (Original) The system of claim 15, wherein the probe tip is adapted to form a
2 second trench in the storage medium during the write operation, a transition between the second
3 trench and the storage surface to represent the first storage state.

1 17. (Currently Amended) The system of claim 16 9, further comprising:
2 an encoder to encode input data to produce encoded data to reduce a number of
3 transitions between the first and second storage states in a sequence of storage cells; and
4 write circuitry to cause the probe to write the encoded data to the storage medium
5 by forming at least the trenches in the storage medium.

1 18. (Original) The system of claim 17, wherein the encoding performed by the
2 encoder causes each of the trenches to have greater than a predetermined length.

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1 19. (Currently Amended) A method of storing data in a storage device, comprising:
2 forming, with a probe, a first structure in a storage medium, the storage medium
3 further comprising a second structure;
4 indicating a first data state in response to detecting a transition between the first
5 structure and the second structure in a first storage cell; and
6 indicating a second data state in response to detecting lack of transition between
7 the first structure and the second structure in a second storage cell, wherein the second storage
8 cell contains the first structure but not the second structure; and
9 indicating the second data state in response to detecting lack of transition between
10 the first structure and the second structure in a third storage cell, wherein the third storage cell
11 contains the second structure but not the first structure.

1 20. (Original) The method of claim 19, wherein the first structure comprises a trench,
2 and the second structure comprises a surface of the storage medium,
3 wherein forming the trench comprises heating a temperature of a tip of the probe
4 to greater than a write temperature to cause a portion of the storage medium to melt.

1 21. (Original) The method of claim 20, wherein detecting a transition comprises
2 detecting a transition between the trench and the surface of the storage medium.

1 22. (Original) The method of claim 20, further comprising:
2 receiving input write data;
3 encoding the input write data to produce encoded write data; and
4 writing the encoded write data to storage cells of the storage medium instead of
5 the input write data,
6 wherein writing the encoded write data to the storage cells comprises writing
7 variable length trenches in the storage medium.

1 23. - 24. (Cancelled)

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- 1 25. (New) The storage device of claim 3, further comprising:
 - 2 a read circuit to produce a first indication in response to the probe being engaged
 - 3 with the first structure, and to produce a second indication in response to the probe being
 - 4 engaged with the second structure, the read circuit to:
 - 5 indicate that the first storage cell has the first state in response to detecting
 - 6 a change from the first indication to the second indication,
 - 7 indicate that the second storage cell has the second state in response to
 - 8 detecting the first indication associated with the second storage cell without detecting the second
 - 9 indication associated with the second storage cell, and
 - 10 indicate that the third storage cell has the second state in response to
 - 11 detecting the second indication associated with the third storage cell without detecting the first
 - 12 indication associated with the third storage cell.
- 1 26. (New) The storage device of claim 25, wherein the read circuit comprises:
 - 2 a sensing device coupled to the probe,
 - 3 the sensing device to produce the first and second indications, and
 - 4 a decoder to receive the first and second indications from the sensing device to
 - 5 provide outputs indicating states of storage cells.

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- 1 27. (New) The system of claim 9, wherein the storage device further comprises:
 - 2 a read circuit to produce a first indication in response to the probe being engaged
 - 3 with the trench, and to produce a second indication in response to the probe being engaged with
 - 4 the storage surface away from the trench, the read circuit to:
 - 5 indicate that the first and second storage cells store respective data bits
 - 6 having the first storage state in response to detecting a change between the first indication and
 - 7 the second indication,
 - 8 indicate that the third storage cell has the second storage state in response
 - 9 to detecting the first indication associated with the third storage cell without detecting the second
 - 10 indication associated with the third storage cell, and
 - 11 indicate that the fourth storage cell has the second storage state in response
 - 12 to detecting the second indication associated with the fourth storage cell without detecting the
 - 13 first indication associated with the fourth storage cell.